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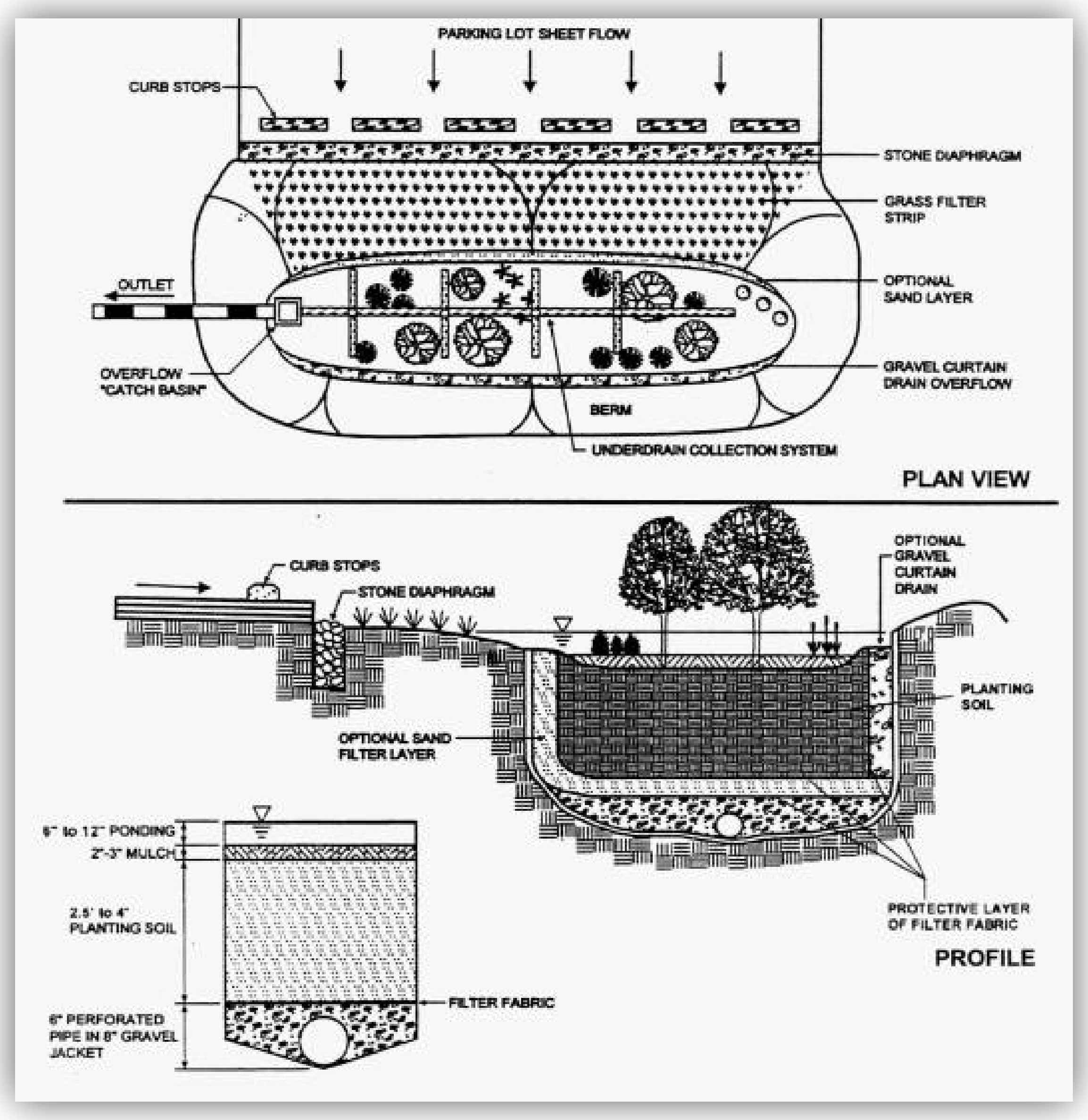
STORM WATER MANAGEMENT

MDE Compliance:
The management of stormwater runoff is necessary to protect the environment and shall be in compliance with the 'Maryland Department of the Environment - Stormwater Management Program', per the 'Stormwater Management Act of 2007'.

Recharge Volume: The state of Maryland requires that urban development maintain 100% of the average annual predevelopment groundwater recharge volume.

This is accomplished by using small-scale stormwater management practices, nonstructural techniques, and better site planning to mimic natural hydrologic runoff characteristics and minimize the impact of land development on water resources.



Bioretention Detail

Bioretention with Parking Lot

Dry Detention Facility

- Some major areas of emphasis include, but are not limited to:
  - Reducing the generation of stormwater runoff borne pollution;
  - BMP performance
  - Longevity, safety, and ease of maintenance
  - Community acceptance and environmental benefit
  - Erosion & sediment control

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WATER QUALITY & CHANNEL PROTECTION

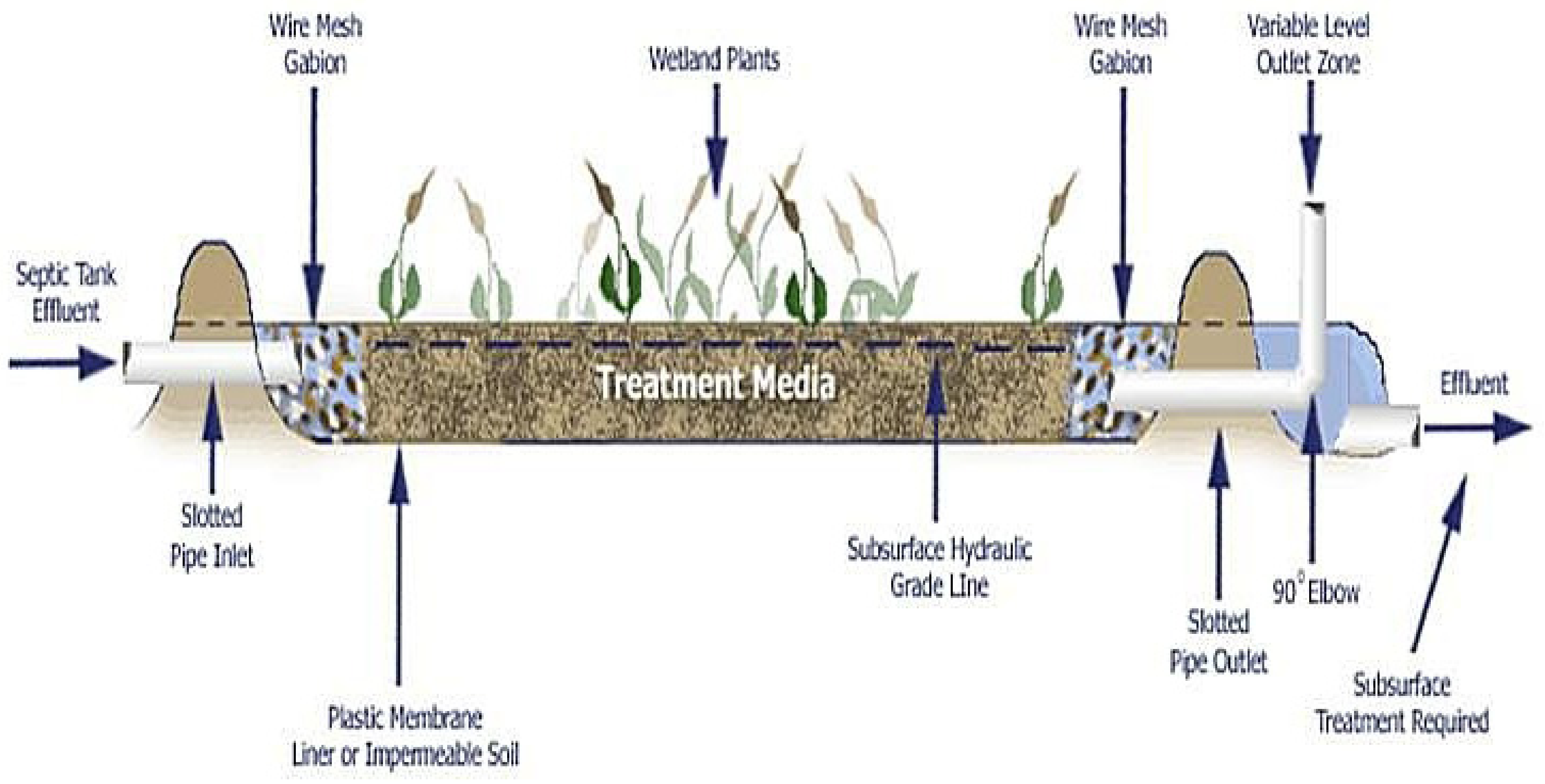
Ground Surface Storage Tank

Water Quality Volume:

Water quality stormwater BMP’s shall serve to reduce the impact of urban development on the environment by incorporating dry detention facilities, infiltration practices, filtering systems, and open channels.

The BMP performance criteria for the state of Maryland includes:

- General Feasibility
- Conveyance
- Pretreatment
- Treatment/Geometry
- Environmental/Landscaping
- Maintenance



Constructed WWTP Wetlands

Channel Protection:

Channel erosion control will be implemented by:

- Reducing the peak rate of discharge by use of detention facilities;
- Controlling the time over which the peak volume of discharge is released by use of grass swales (greater time of concentration than that of storm sewer pipes);
- Reducing the rainfall runoff volume by promoting infiltration by use of bioretention facilities and grass swales.

Stormwater discharges are included within the National Pollutant Discharge Elimination System (NPDES) General Permit approval process.

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PHOTOVOLTAICS

PhotoVoltaics in Geneva

- (PVs) are arrays of cells containing a solar photovoltaics material that converts solar radiation into direct current electricity
- Solar cells produce direct current electricity from light
- Today the majority of photovoltaic modules are used for grid connected power generation

- 8,000 m^2 U.S. Mission to the United Nation in Geneva, Switzerland
- The **largest solar energy installation** ever undertaken by the Department of State overseas in 2005
- 950 square meter, 118 kW peak power installation

H&A visited the site and performed a study and economic analysis to determine the viability of installing a PhotoVoltaic (PV) system…

As a result of the site assessment, the engineers concluded that up to 118 kilowatts of peak PV capacity could be fielded on the facades and roof surfaces.

- PV solar panels were installed at Geneva to not only generate clean electricity, but to also decrease solar gain on the building thereby decreasing the air conditioning load
- Energy - related cost savings and revenue generation will allow the State Department to recoup capital costs in seven years for the PV system.

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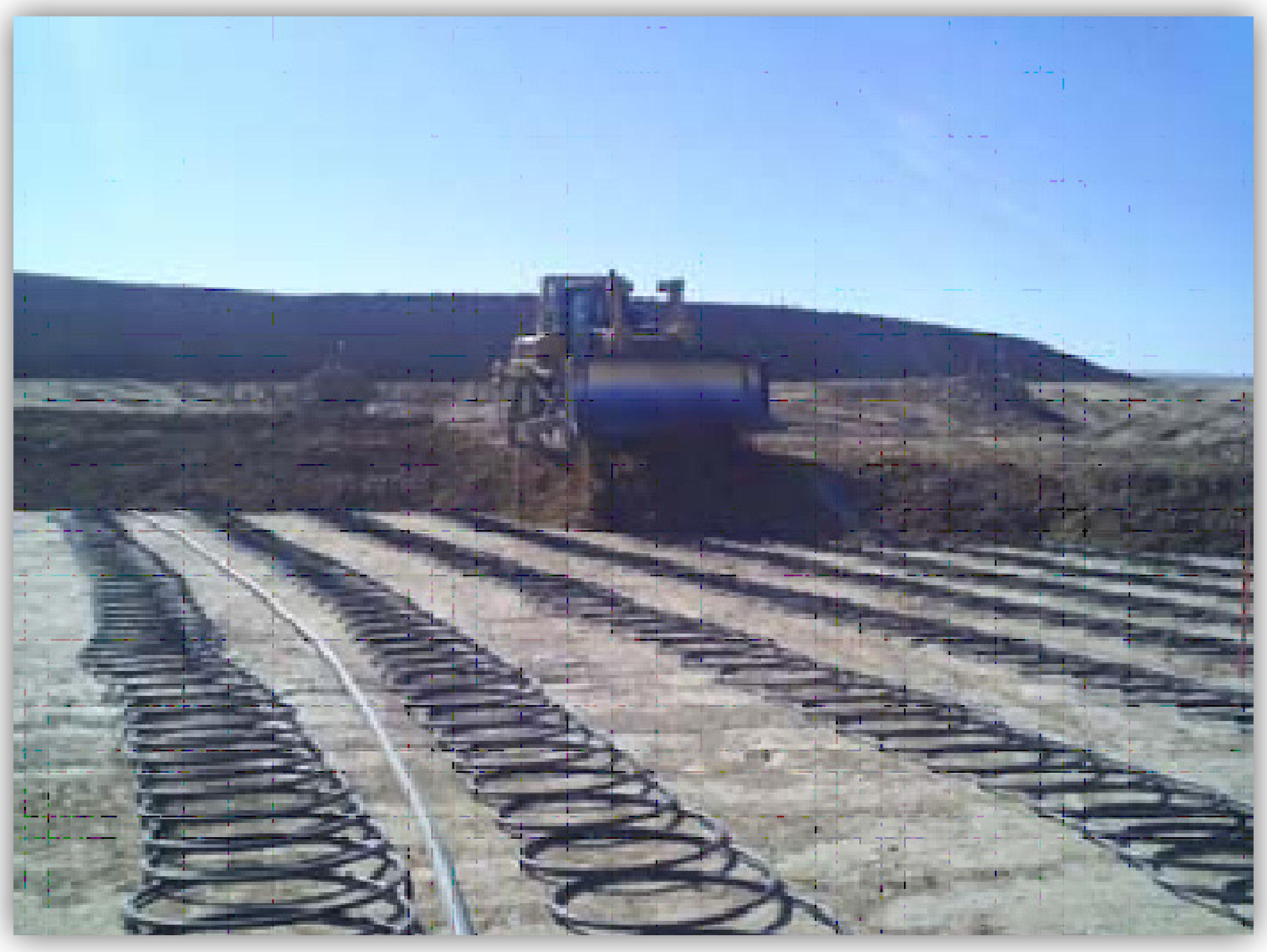
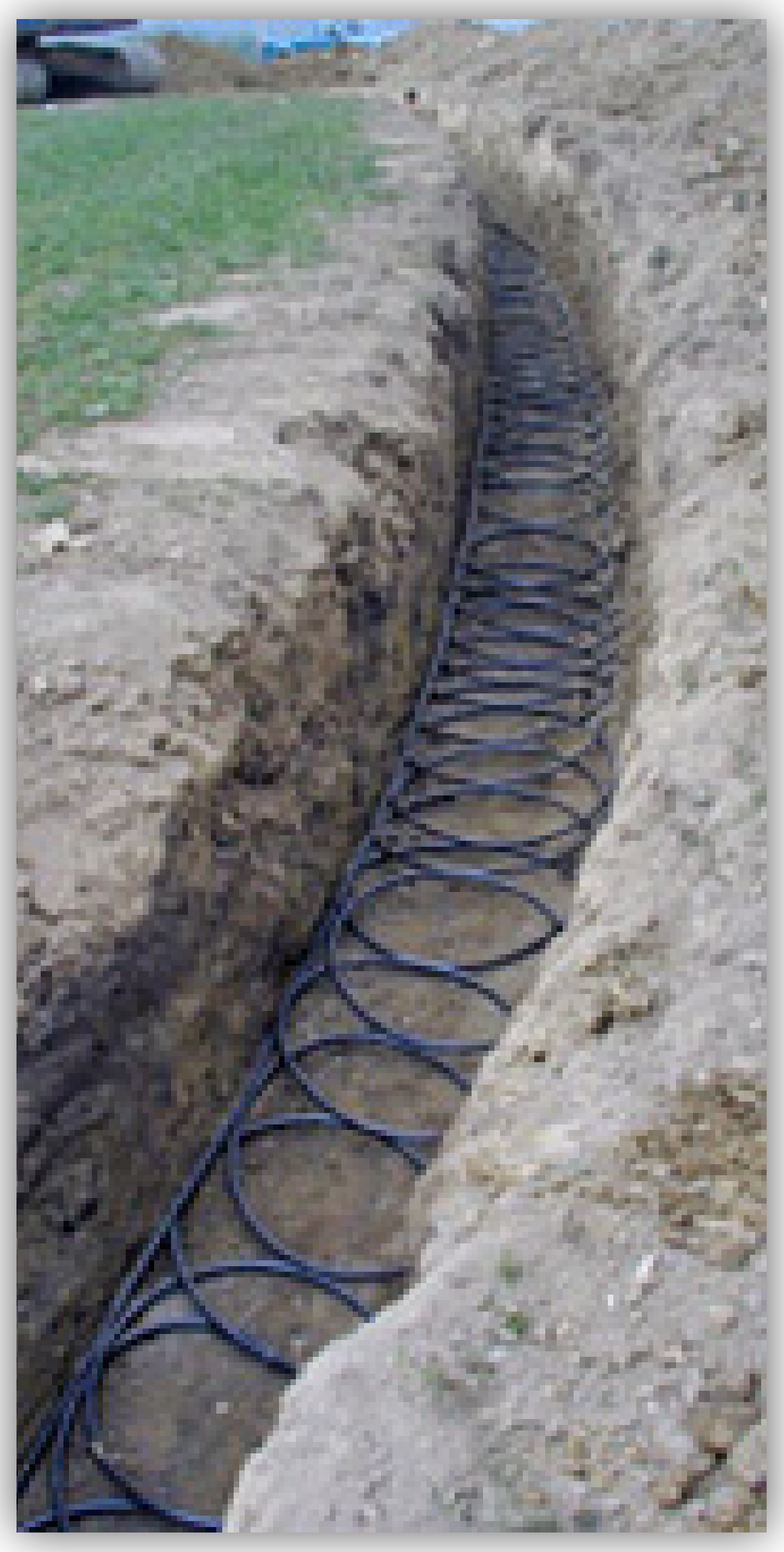
GROUND-SOURCED HEAT PUMPS



- **Ground-source heat pumps (GSHP's)** extract or reject heat to a water loop in order to produce heating or cooling for a building or process:
- The water loop is coupled with the ground in some manner so that the earth is used as a large heat sink.
- The technology behind GSHP's is simple and well established: the vapor compression cycle as used as in most refrigeration and AC equipment.



- **For the FASTC project**, ground source heat pumps will use an environmentally-friendly, food-grade anti-freezing agent in the ground-source loops.
- For smaller systems, a linear horizontal trench will be used with one loop. The trench will be long enough to provide required system capacity.
- For larger systems, a loop field will be used with loops spaced at about 10 feet on center. The loop field is more efficient for larger systems.

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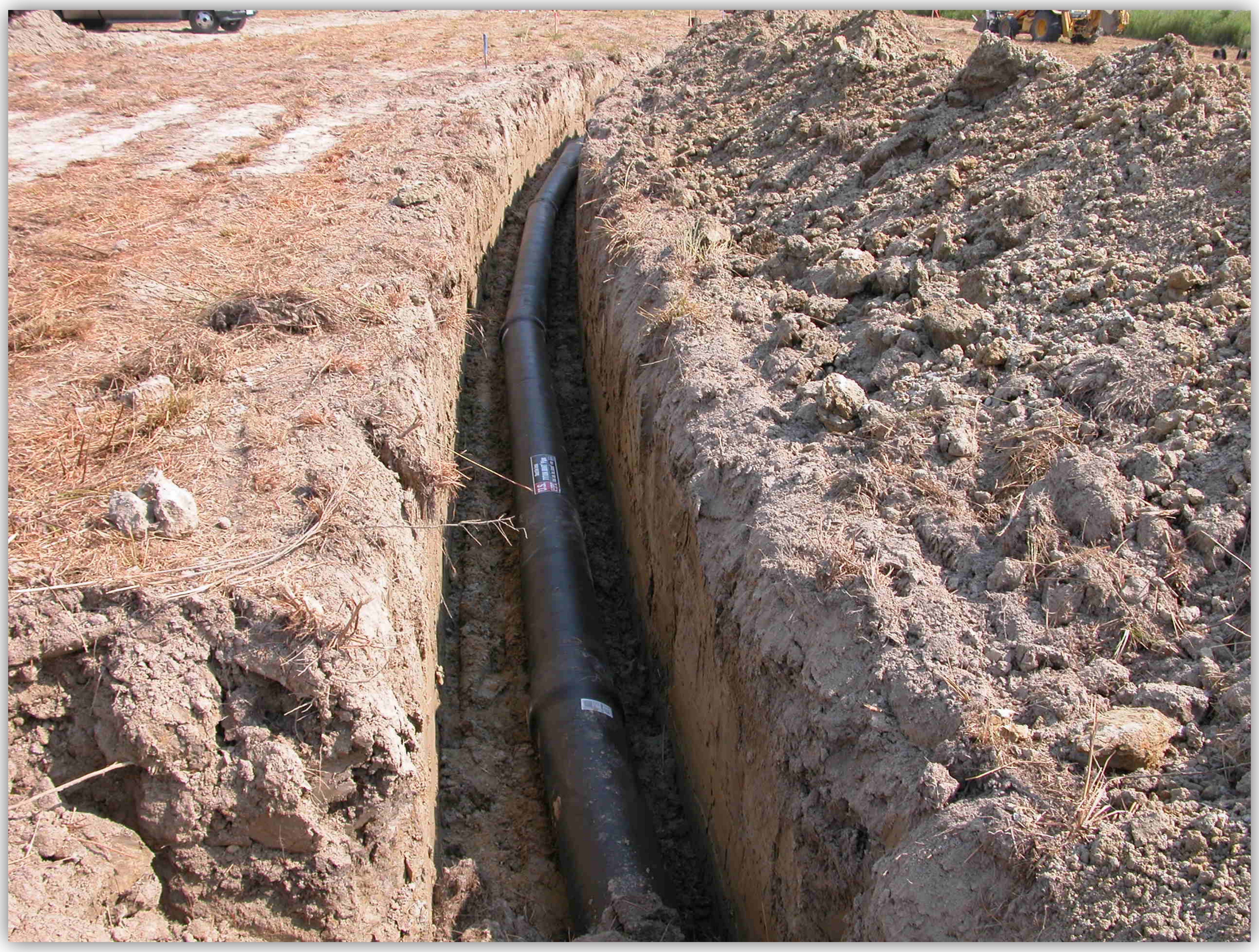
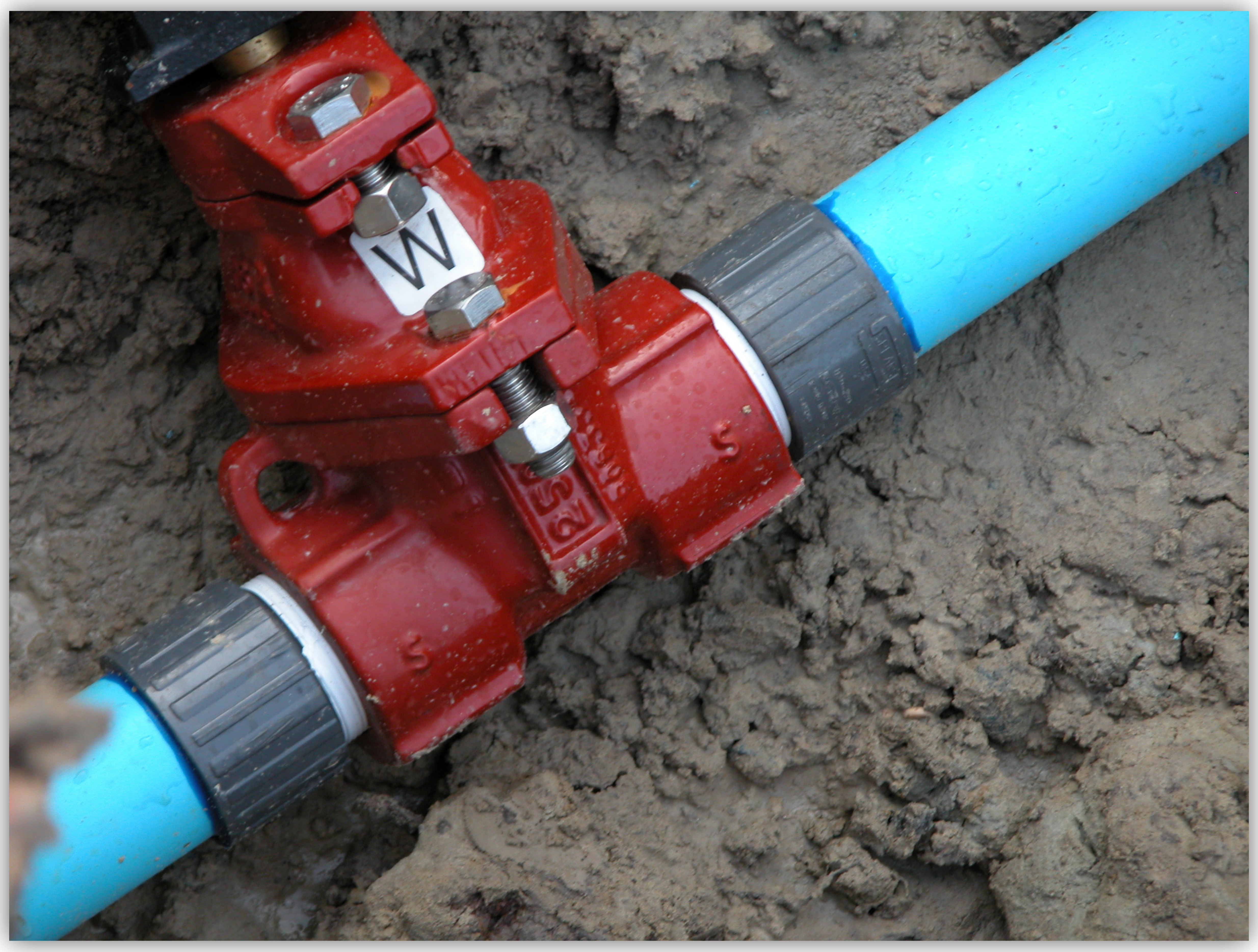
CIVIL INFRASTRUCTURE



Open utility trench with ductile iron pipe water main



Typical water valve used to control water flow in main for service/repairs

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ELECTRICAL INFRASTRUCTURE

Underground conduit distribution

Underground duct bank

Fiber optic cable